## **SCBE 322**

**Science International degree @ Mahidol (SIM)**

Course Name : **Air Quality Monitoring and Management**

 **SCBE 322 3 (2-3-5)**

Lecture : Thu (09:30 - 11:30)

Lab : Thu (13.00 - 16.00)

Semester : Semester II 2020

**Course Coordinator**: Dr. Toemthip Poolpak

**Instructors**: Dr. Toemthip Poolpak (**TP**) Email: toemthip.poo@mahidol.edu

**Teaching assistance:** Kwang Mo Yang (MY)

**Course Description**

Air pollution is of public health concern and big environmental issue on a global scale. Indoor air pollutants result from products used in construction materials, the generation ventilation system may cause microscale air problem. Industrial and mobile sources that contaminate the ambient air may contribute to mesoscale pollution. Macroscale effects include ambient air pollutants in mesoscale transportation over a large distance. Global air pollution effects include acid rain, ozone pollution and climate change. Air quality standard and control and also Clean Air Act are the comprehensive federal law that regulates air emissions from stationary and mobile sources. Additionally, several engineering systems are developed for air treatment and other purposes.

**Course learning outcomes**

After completing the course, students should be able to:

1. Understand sources, mechanisms and chemical reaction of major air pollutants.

2. Understand the health and environmental consequence of polluted air.

3. Understand the air regulation and can apply the broad principle of chemical composition to select technique for control.

4. Produce and analyze data, interpret the information, and effectively communicate in both Thai and English the results of analysis.

5. Design experiment or field-works with knowledge in general characteristics and properties of chemical compounds.

**Grading and evaluations**

Grading for the SCBE322 course is based on several pieces of works. These include class attendance, assignments and laboratory reports, midterm and final exams, a general evaluation from the lecturing staff.

 1. Mid-term examination 30%

 2. Final examination 30%

 3. Attendance and assignments 10%

 4. Laboratory attendance and reports 20%

 4. Presentation (or Fieldtrip) 10%

 Students will be evaluated from their total score (out of 100%). Grading system is A, B+, B, C+, C, D+, D and F.

**Course Outline**

Class is on Thursday 09.30 - 16.00 at Faculty of Science, Phayathai Campus

**Lecture: R503 09.39-11.30**

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| **Date** | **Month** | **Topics** | **instructor** |
| 21 | Jan | Introduction to air pollution: structure of the atmosphere and atmospheric process  | TP |
| 28 | Jan | Earth’s climate system: global circulation and global change | TP |
| 4 | Feb | Ozone and greenhouse gases: ground level ozone formation and ozone depletion; greenhouse gases | TP |
| 11 | Feb | Major air pollution: origin and fate I: CO, particulate matter, methane, halogen and volatile organic carbons  | TP |
| 18 | Feb | Major air pollution: origin and fate II: nitrogen dioxide, sulfur dioxide, photochemical oxidants  | TP |
| 25 | Feb | Micro air pollution: indoor air pollution | TP |
| 4 | Mar | Environmental and health consequences of polluted air: health effects and environmental impact | TP |
| 11 | Mar | Air quality standard: air quality standard and legislation; Clean Air Act | TP |
| **15-19** | Mar | **Midterm examination week** | TP |
| 25 | Mar | Ambient air quality and continuous emission monitoring: monitoring system; selection of instrumentation and methods | TP |
| 1 | Apr | Air quality control and management I: collection device | TP |
| 8 | Apr | Air quality control and management II: Treatment of emission: control of particulate matter and gaseous pollutants | TP |
| 22 | Apr | Air quality control and management III: Control of moving sources: engine fundamental and electric vehicles | TP |
| 29 | Apr | Air quality control and management IV: Biological treatments: bioscrubber and biotrickling filter | TP |
| 6 | May | Field trip | TP |
| **10-21** | **May** | **Final Examination Week** | TP |

**Lab: B413/7 13.00-16.00**

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| **Date** | **Month** | **Topics** | **instructor** |
| 21 | Jan | Laboratory safety  | TP, MY |
| 4 | Feb | Air quality | TP, MY |
| 11 | Feb | Greenhouse effects | TP, MY |
| 18 | Feb | Carbon dioxide and oxygen  | TP, MY |
| 4 | Mar | Particulate matter I: Indoor, Outdoor |  |
| **15-19** | Mar | **Midterm examination week** |  |
| 25 | March |  | TP, MY |
| 1 | Apr | Acid rain: Cause and Effects I | TP, MY |
| 8, 22 | Apr | Acid rain: Effects II | TP, MY |
| 29 | Apr | Project presentation | TP, MY |
| **10-21** | **May** | **Final Examination Week** | TP |

**References**

Davis M and Masten SJ. 2020. Principles of Environmental Engineering and Science, 4th eds. McGrawHill, NY.

Schnelle KB, Dunn RF, Ternes ME. 2016. Air pollution control and handbook, 2nd eds. CRC Press, FL.

Vesilind PA, Morgan SM, Heine LG. 2004. Introduction to Environmental Engineering, 3rd eds. Cengage Learning, CT.

**Teaching and Evaluation Methods**

 Teaching will be in the classroom with interacting perspectives. A textbook is required and course content will follow the recommended textbook.

 Field trip may be provided to fit the lecture topics. If done field trip reports will be required.

 Midterm and final examinations are in a written format and will be announce at the beginning of the class or with this course outline.